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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/925,153	08/08/2001	Fumihiko Nakamura	09792909-5122	3081

26263 7590 09/15/2004

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EXAMINER

BLUM, DAVID S

ART UNIT PAPER NUMBER

2813

DATE MAILED: 09/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/925,153

Applicant(s)

NAKAMURA ET AL.

Examiner

David S Blum

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/19/04.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-16 and 18-27 is/are pending in the application.
- 4a) Of the above claim(s) 6-12 and 20-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,13-16,18 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) 1,2,4-16 and 18-27 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

This action is in response to the responses filed 6/10/04 and 7/19/04.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 4-5, 13-16, and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maruska (US005998232A) in view of Goetz (US006441393B2).

Maruska teaches the device of claims 1-2, 4-5, 13-16, and 18-19 except for explicitly teaching cadmium.

Maruska teaches a device (column 3 lines 25-26) having stack of layers including a GaN or AlN buffer layer (column 4 line 65) as in claims 5 and 19. The layer may be doped with p-type conductivity ions (column 5 lines 13-14). Maruska teaches as examples such p-type ions as beryllium, magnesium, calcium, carbon, and zinc (column 5 lines 13-15). These ions are taught as examples (such as) and are not taught as an exclusive list. Goetz teaches doping a GaN layer with p-type dopants such as magnesium, beryllium, zinc, and/or cadmium. Note that the two lists overlap in teaching magnesium, beryllium, and zinc.

Art Unit: 2813

Thus, using cadmium is well known in the art for p-type dopants in these (GaN, AlN) layers. The selection of a known material based on its suitability for its intended use supported a prime facie obviousness determination in *Sinclair and Carroll, Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945 “Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle.” 65 USPQ at 301).

Further, the instant specification teaches doping with a type IIB element (page 10) and teaches using cadmium (type IIB), magnesium (type IIA) or zinc (type IIB) (page 12), with no criticality taught between the element choices. Note that both Maruska and Goetz each teach the remaining two ions of the instant specification, zinc and magnesium.

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions or of any unexpected results arising there from. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in the claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1515, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

GaN is a group III-V compound and clearly a nitride compound (the N representing nitrogen). The metes and bounds of “heavily doped” in claims 1, 2, 13, and 16, is not defined in these claims and the teachings of Maruska are considered to teach “heavily doped”.

Art Unit: 2813

Further, the p-type doping of Maruska is 5×10^{18} to $1 \times 10^{20}/\text{cm}^3$ (column 7 lines 15-16), which is in the range of claims 4 and 18 (not less than $1 \times 10^{17}/\text{cm}^3$), these claims setting the metes and bounds of "heavily doped".

The layer is used as isolation in LEDs or laser diodes (column 3 lines 26-27) as in claim 14.

An active layer is formed on the GaN layer (column 4 line 62-column 5 line 4) as in claim 15.

It would be obvious to one skilled in the requisite art at the time of the invention to modify Maruska to include cadmium in the group of dopant ions as Goetz teaches cadmium to be a well-known p-type dopant.

Response to Arguments

3. Applicant's arguments filed 6/10/04 have been fully considered but they are not persuasive.

The applicant argues that Maruska does not teach a buffer layer with cadmium and Goetz teaches a layer doped with cadmium, but it is not a buffer layer. The applicant also argues that various layers of semiconductor devices have specific characteristics and serve different purposes and accordingly comprise specific materials to effect those characteristics and purposes.

Art Unit: 2813

The examiner agrees that Maruska does not teach a buffer layer with cadmium and Goetz teaches a layer doped with cadmium, but it is not a buffer layer and that various layers of semiconductor devices have specific characteristics and serve different purposes and accordingly comprise specific materials to effect those characteristics and purposes. However, the list of dopants in both Maruska and Goetz overlap in that they both list magnesium and beryllium (both type IIA elements on the periodic chart) and zinc (a type IIB element on the periodic chart). Thus it is clear that both Maruska and Goetz are using material that will yield the same specific characteristics. Cadmium is a type IIB element as zinc. Thus, although the instant application and Maruska dope a buffer layer and Goetz dopes a P layer, it is clear from both Maruska and Goetz that elements within the same elemental group on the periodic table are interchangeable. Knowing that elements within the same periodic group are interchangeable, and that it is known to dope GaN with cadmium, and that Maruska teach an overlapping list of dopants, one of ordinary skill in the requisite art would know that cadmium could be used as the dopant in Maruska and obtain similar characteristics to the zinc listed in Maruska. It is important to note that the specification taught and the original claim 1 only claimed a type IIB element, with no criticality taught among the different elements. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions (elements) or of any unexpected results arising there from. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in the claim, the Applicant must show that the chosen dimensions

Art Unit: 2813

(elements) are critical. In re Woodruff, 919 F.2d 1515, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, the teaching of Sinclair does not work against the examiner and the combination of Maruska and Goetz is obvious.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 2813

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (571)-272-1687) and e-mail address is David.blum@USPTO.gov .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr., can be reached at (571)-272-1702. Our facsimile number all patent correspondence to be entered into an application is (703) 872-9306. The facsimile number for customer service is (703)-872-9317.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David S. Blum

September 10, 2004